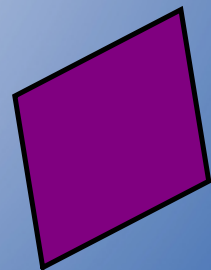
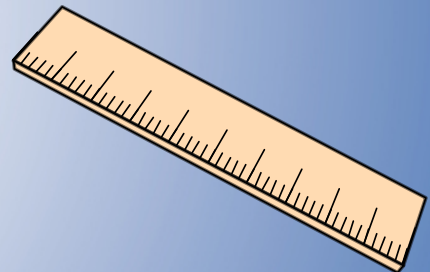
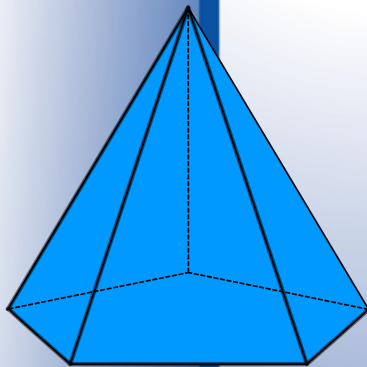
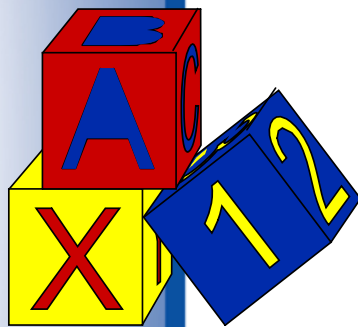
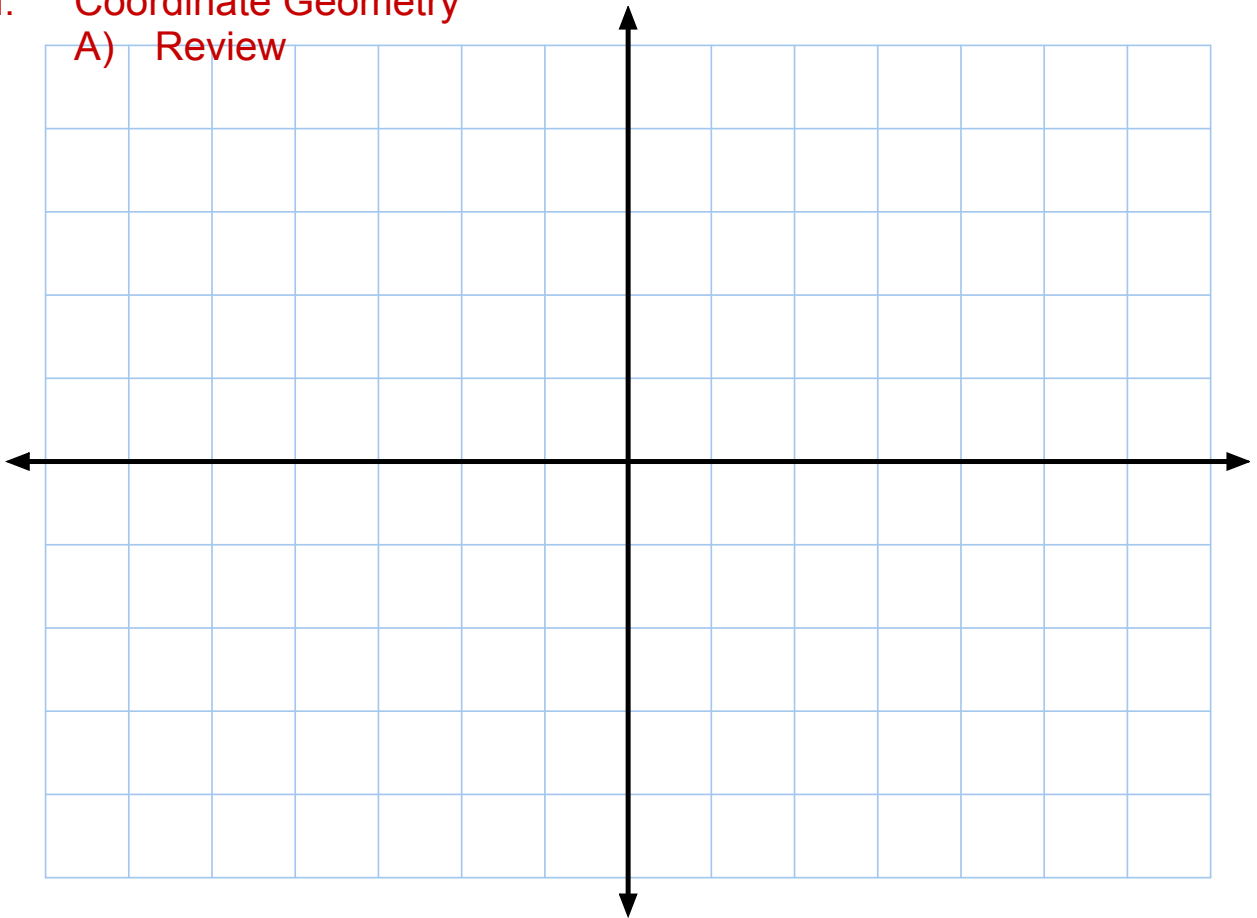


# UNIT 1

## Basics of Geometry



I. Coordinate Geometry  
A) Review



## 1.2

### Building Blocks of Geometry

#### A) Point

a location in space

- 1) has no size
- 2) Named by ONE capital letter

#### B) Space

the set of all points

#### C) Line

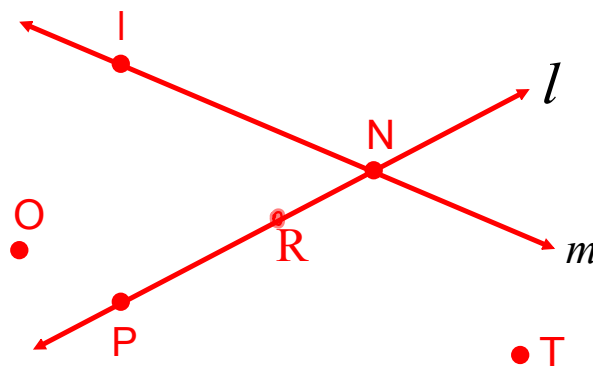
extends in opposite directions without end

- 1) has no width
- 2) cannot be measured
- 3) named by TWO capital letters or ONE lower case cursive letter





3) Collinear Points are points that lie on the same line



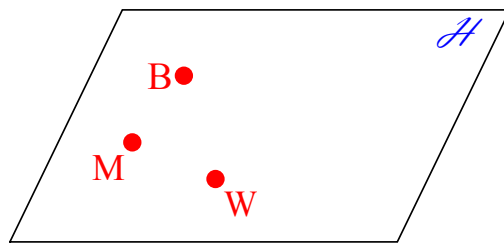
a) Any two points are collinear!!

b) Name each line two ways

D) Plane

a flat surface with no thickness

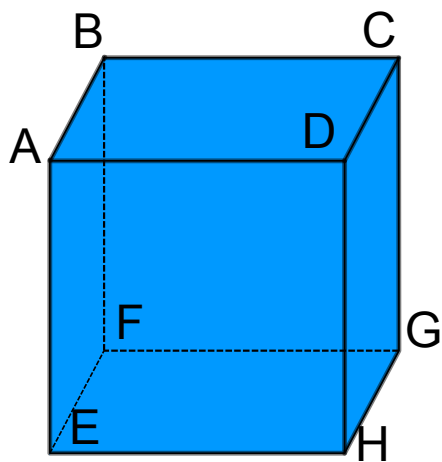
- 1) extends in all directions without end
- 2) named by ONE cursive capital letter or 3 non-collinear points



3) Name the plane two ways



3) Points and lines in the same plane are coplanar.



a) Any three points are coplanar!!

b) name a plane that contains segment FG?

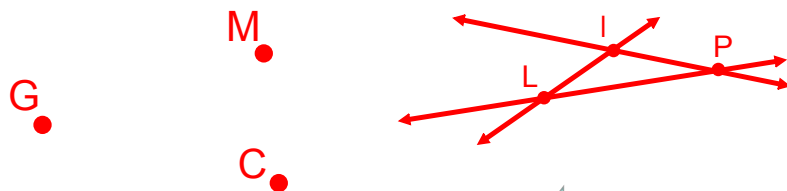
c) Name the planes that contain D?



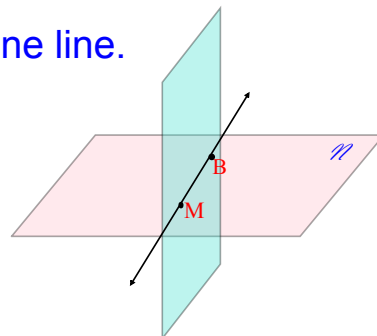
### III. Plane Postulates

A) Postulate (or axiom) is an accepted statement of fact.

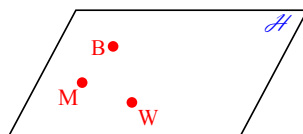
1) Two points determine a line.



2) Two planes intersect in exactly one line.



3) Three non- collinear points determine exactly one plane.



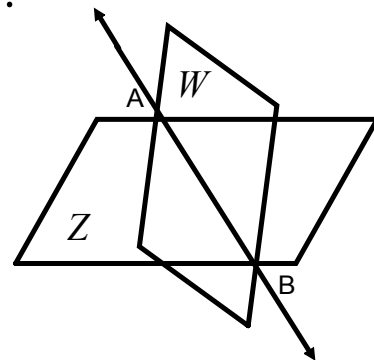
# Bellwork

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1. Complete: \_\_\_\_ points determine a line. \_\_\_\_ points determine a plane.
2. Give three names for a line that contains points A and B.

Refer to the figure for questions 3 and 4.

3. Name a line in plane Z.
4. How many lines are in the plane Z?



## Notes: Section 1.3 - Using Formulas

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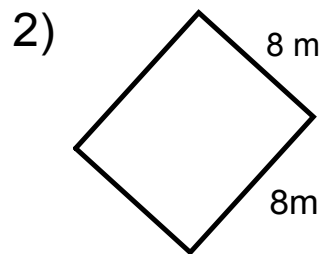
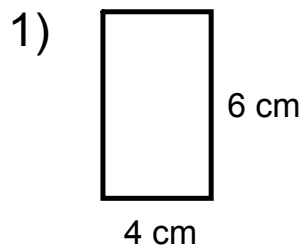
I. Area: amount of space inside the figure (expressed in units squared)

$$A = l * w$$

II. Perimeter: distance around a figure

$$P = 2l + 2w$$

ex: Find the perimeter and area of each rectangle.



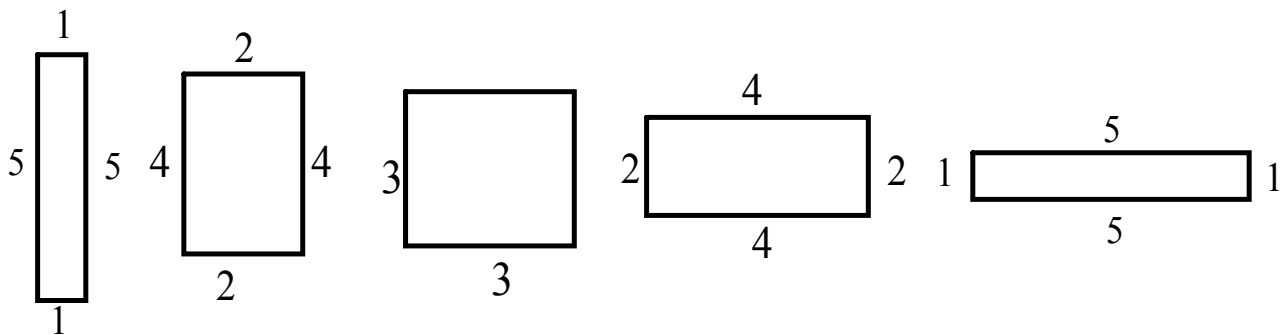
ex: Find the missing measure in each formula.

3)  $l = 3$ ,  $w = ?$ ,  $P = 20$

4)  $l = ?$ ,  $w = 4$ ,  $A = 36$

III. Max Area: when given a figure's perimeter, you can find the most space that figure will contain.

ex: One type of pet enclosure is made up of 12 sections of fencing, connected by hinges. This enclosure folds for easy storage and is flexible for making different-sized areas in which your pet can play. Suppose the sections are positioned to make a rectangle. What are the dimensions of the rectangle that provided the maximum area for your pet?



$w$	$l$	Area = $l * w$
1	5	5
2	4	8
3	3	9
4	2	8
5	1	5

CP

$$1) 10 + x = -4$$

$$2) 7 = 15 - x$$

$$3) 12 = -3x$$

$$4) \frac{x}{10} = -3$$

$$5) 20 = \frac{4}{3}x$$

$$6) 17 = 15 - 2x$$

$$7) 7x + 4 = 10x - 11$$

$$8) 7x + 8 - 11x = 2 - x$$

$$9) 3(x - 2) - x = 14$$

$$10) 7(x + 4) + 3x - 12 = 2x$$

Hon

1)  $11 - y = 4$

2)  $\frac{a}{5} = -3$

3)  $6y = -14$

4)  $7a - 10a = 3a + 6$

5)  $7(4x + 3) = 10$

6)  $-1 + 2(m + 1) = 5(2m - 3)$

7)  $2a - (a + 4) = 10$

8)  $\frac{2}{3}x - 11 = 2$

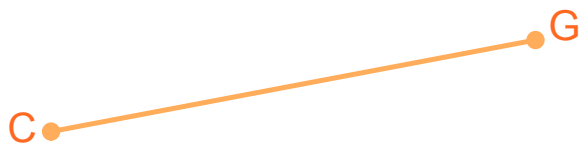


1.4

Geometric terms

A) Segment

part of a line with two endpoints.

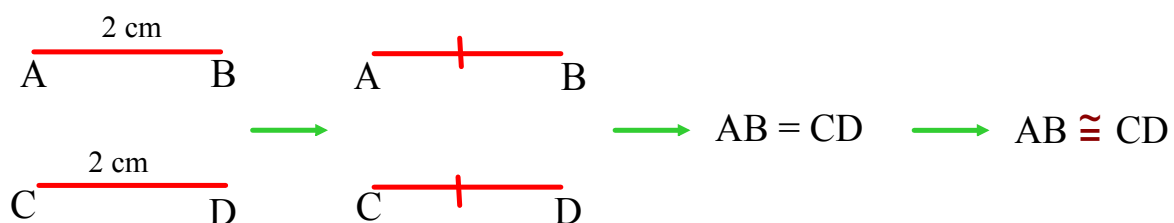


$CG$  represents the measure of the segment

$\overline{CG}$  represents the picture of the segment

## Measuring Segments and Angles

- A) Congruent Segments have the same length
- B) Congruent Angles have the same degree measure



measure of AB = \_\_\_\_\_

AB means

$\cong$  means

### Segment Addition Postulate (SAP)

If three points A, B, and C are collinear and B is between A and C, then



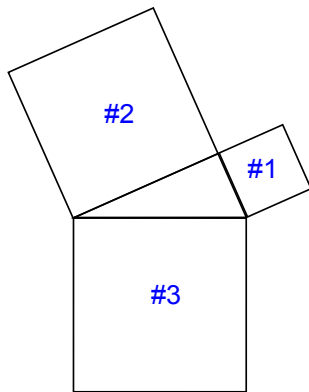
$$AB + BC = AC$$

Examples:

1. If B is between A and C  
 $AC = 23$   
 $AB = 2x - 6$   
 $BC = x - 7$   
Find AB and BC

2. If N is between A and B  
 $AN = 4x - 20$   
 $AB = x + 40$   
 $NB = 2x + 30$   
Find AB

3. If N is between A and B  
 $AN = \frac{2}{3} (4x - 5)$   
 $BN = \frac{1}{3}$   
 $AB = \frac{3}{5} (2x + 1)$   
Find AN,  
BN,  
AB



If each square was a piece of gold, which would you rather be given:

- a) both piece #1 and #2 or
- b) piece #3

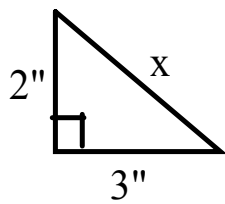
A) Pythagorean Theorem

the sum of the squares of the legs (sum of the area of #1 and #2) are equal to the square of the hypotenuse (area of #3)

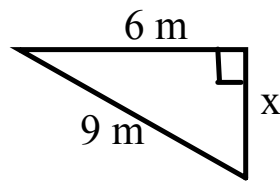
In the right triangle,  $a$  and  $b$  are the legs and  $c$  is the hypotenuse, then

$$a^2 + b^2 = c^2$$

Ex:  
1)



2)



3)

leg = 9 cm  
leg = \_\_\_\_\_  
hypotenuse = 15 cm

Hint: Check your measures...the hypotenuse should be the longest.

B) Pythagorean Triples

a set of three positive integers that makes the pythagorean theorem true.

Ex:

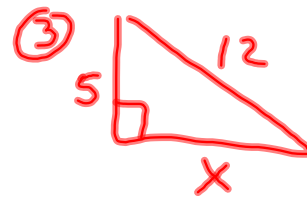
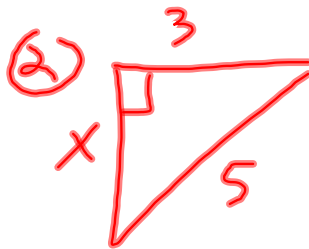
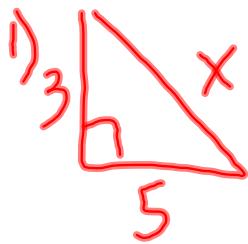
Are the sets of numbers pythagorean triples?

1) 12, 16, 20

2) 9, 40, 41

3) 18, 24, 32

One of the most common triples is 3 - 4 - 5.



Bis between  $X$  &  $D$

④  $XB = 3X$   
 $XD = 8$   
 $BD = 5X$

$X = ?$   
 $BD = ?$

⑤  $XD = 50$   
 $XB = 3(X+7)$   
 $BD = 2(X-3)$

$X = ?$   
 $XB = ?$

④ Find the distance between  $(-3, 10) : (4, -1)$



C) Distance between two points

1) on the number line  $D = |a - b|$

2) on the coordinate plane

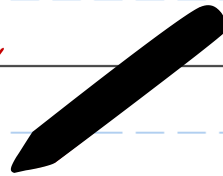
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Ex: Find AB if you are given the following points:

1) A(4, 8) and B(2, -3)

2) A(-1, -2) and B(2, 4)

# HOMEWORK



Hon : pg 33 #16 - 31, 35-40  
exact answers ONLY  
Quiz on Wed on 1.1-1.4

1.5

A) Midpoint on a number line (average the endpoints)  $(a+b)/2$

X is the midpoint of R and S R=5, S=-9 X=\_\_\_\_\_

R= 8, X= 3 S= \_\_\_\_\_

B). Midpoint of a segment  
(average of the endpoints)

$$M(x_m, y_m) = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

midpoint = \_\_\_\_\_

Ex: If M is the midpoint of the segment AB,

1) Find M if  
A(8, 9)  
B(-6, -3)

2) Find M if  
A(-3, -5)  
B(2, 7)

3) Find B if  
A(1, 4)  
M(-1, 5)

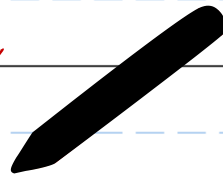
- C) Midpoint is a point that divides a segment into two congruent segments
- D) Segment Bisector- segment that intersects at the midpoint of a segment
- E) Perpendicular Bisector is a line, segment or ray that forms a right angle at its midpoint.

Examples: If C is the midpoint of  $\overline{AB}$ :

4.  $AC = 5x + 9$   
 $CB = 8x - 36$   
Find AC

5.  $BC = 2x + 5$   
 $AB = 3x + 18$   
Find AB

# HOMework



CP: pg 29    #1 - 16  
pg 32    #70 - 73  
pg 47    #8 - 19

## 1.6 Angles

### A) Ray

part of a line with one endpoint  
\*always list the endpoint first\*



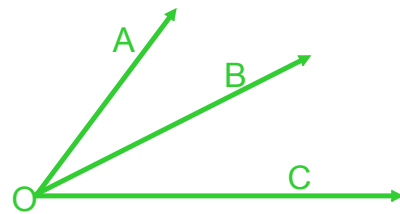
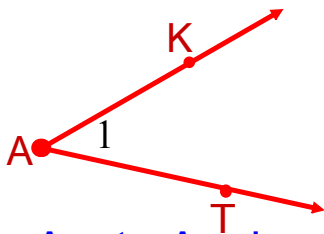
### B) Opposite Rays

two collinear rays with a common endpoint  
\*always forms a line\*

## Angle Relationships

### A) Angle

formed by two rays with  
the same endpoint



B) Acute Angle measures  $> 0$  and  $< 90$

C) Right Angle measures  $= 90$

D) Obtuse Angle measures  $> 90$  and  $< 180$

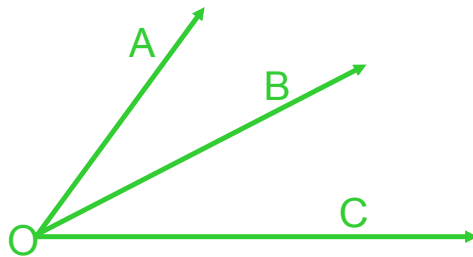
E) Straight Angle measure  $= 180$

F) Perpendicular Lines are lines that intersect  
to form right angles



### Angle Addition Postulate (AAP)

- 1) If pt B is in the interior of  $\angle AOC$ , then  
 $m\angle AOB + m\angle BOC = m\angle AOC$

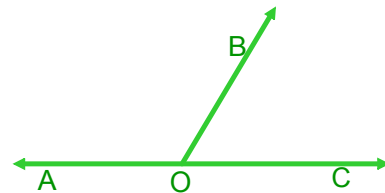


- 2) If  $\angle AOC$  is a straight angle, then  
 $m\angle AOB + m\angle BOC = 180$

Examples:

1. If pt B is in the interior of  $\angle AOC$ ,  
 $m\angle AOB = x + 3$   
 $m\angle BOC = 2x + 4$   
 $m\angle AOC = 25$   
Find  $m\angle BOC$

2.  $m\angle AOB = 4x + 15$   
 $m\angle BOC = x + 25$   
Find  $x$

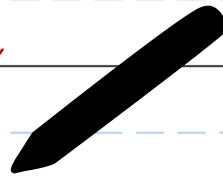


D) Angle Bisector is a ray that divides an angle into two congruent angles

Examples:

3. Find  $m\angle AWB$  if  $\overrightarrow{WR}$  bisects  $\angle AWB$  and  
 $m\angle AWR = x$   
 $m\angle BWR = 4x - 48$

# HOMEWORK



CP: pg 22    # 31 - 33  
pg 30    # 26 - 34  
pg 40    #44 - 48 (even)

## 1.7

### Complementary Angles

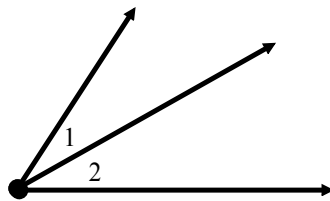
two angles whose measures have a sum of 90

### Supplementary Angles

two angles whose measures have a sum of 180

### Adjacent Angles

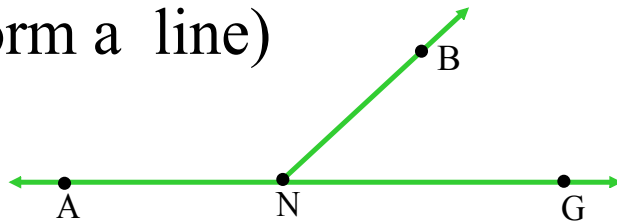
two coplanar angles with a common side, common vertex



### Linear Pair

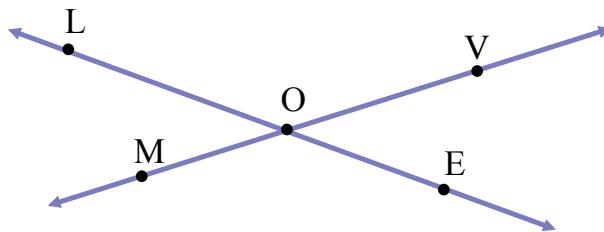
a pair of angles that are adjacent and supplementary

(they form a line)

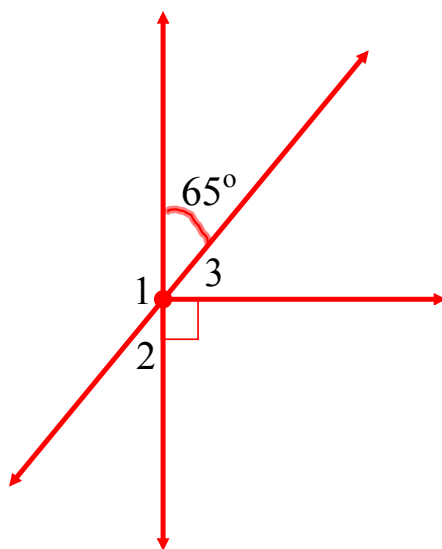


### Vertical Angles

two non-adjacent angles formed by intersecting lines



\*All vertical angles are congruent\*

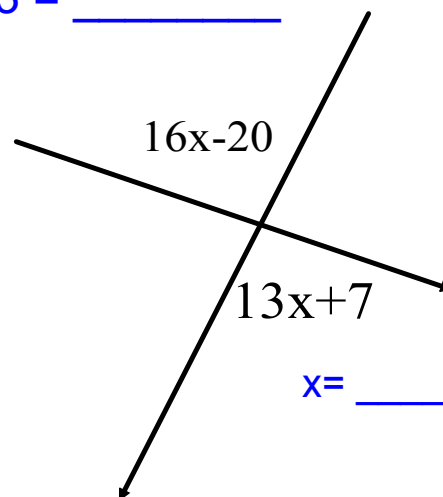
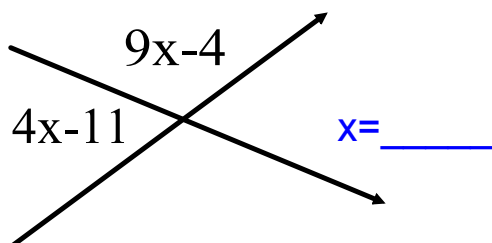


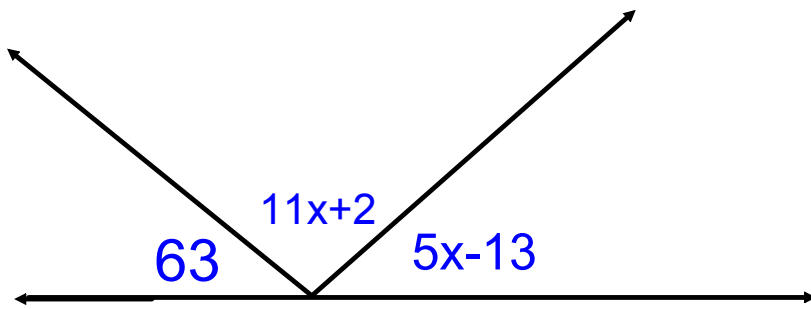
Find the measure of each:

$$m\angle 1 = \underline{\hspace{2cm}}$$

$$m\angle 2 = \underline{\hspace{2cm}}$$

$$m\angle 3 = \underline{\hspace{2cm}}$$





$x =$  \_\_\_\_\_



\_\_\_\_\_pts determine a line  
 \_\_\_\_\_pts determine a plane

R

$\mathbb{R}$

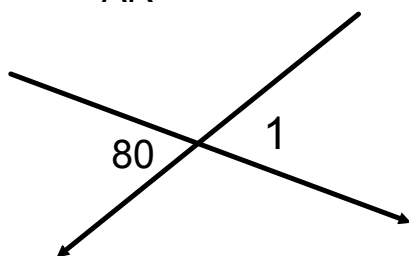
r

AR

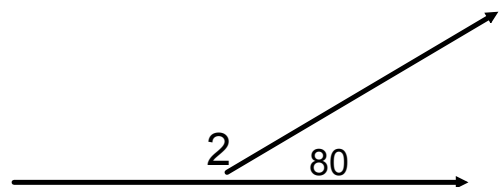
$\overline{AR}$

$\overrightarrow{AR}$

postulate-  
theorem-



$m\angle 1 =$  Why?



$m\angle 2 =$  Why?

## Theorems

1. vertical angles

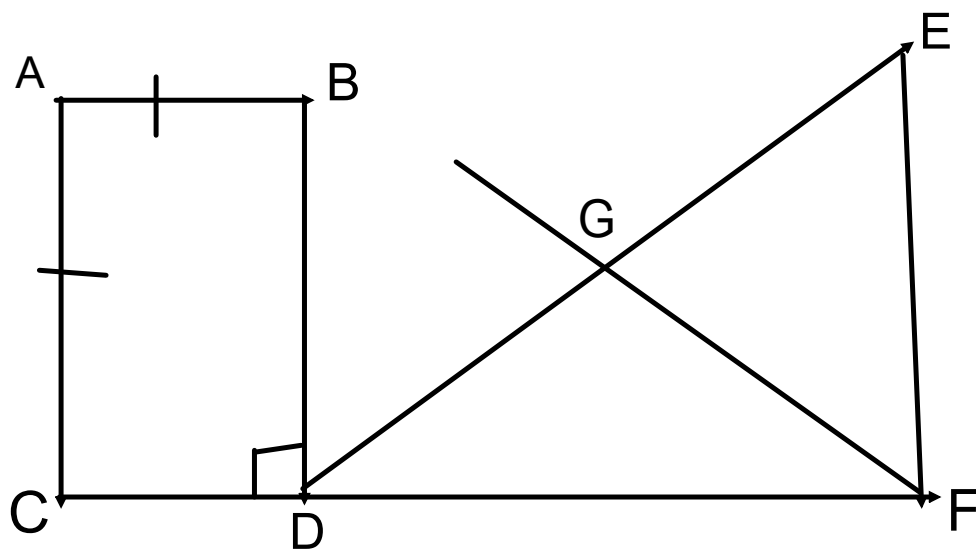


2. angles in a linear pair are



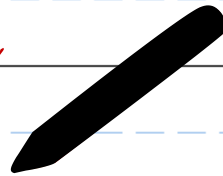
3. Perpendicular lines form





Can you assume the following things?

# HOMEWORK



CP: pg 29    #1 - 16  
pg 32    #70 - 73  
pg 47    #8 - 19

## VI. Patterns and Reasoning

### A) Inductive Reasoning

reasoning based on patterns you observe

### B) Conjecture

educated guess

Make a conjecture:

1.  $\angle A$  is complementary to  $\angle B$
2.  $\angle A$  and  $\angle B$  are a linear pair
3. A,B,C then  $AB = 10$ ,  $BC = 8$  and  $AC = 5$

### C) Counterexample

An example that makes a conjecture false.

- Ex:
- #1 The sum of two prime numbers is a prime number.
  - #2 Given: P,Q, R are collinear  
conjecture: Q is between P and R
  - #3 Given: A,B,C are collinear and B is between A & C  
Conj: B is the midpoint of  $\overline{AC}$

B. Counterexample: shows that a conditional is false.

1. Only one counterexample is needed to show that a conditional is false.
2. Statements or pictures can be used as counterexamples.

Ex: Find a counterexample to show the conditional is false.

1) If  $x^2 \geq 0$ , then  $x \geq 0$ .

2) If you live in SC, then you live in Charleston.

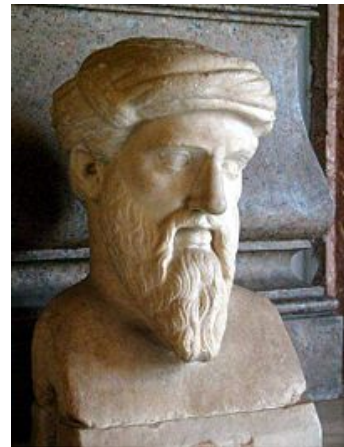
3) If B is between A and C, then B is the midpoint of  $\overline{AC}$ .

D) Deductive Reasoning  
process of facts, definitions, accepted properties in a logical order

Ex: Give an example of deductive reasoning

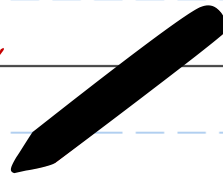
Pythagoras and his students believed that everything was related to mathematics and that numbers were the ultimate reality, and, through mathematics, everything could be predicted and measured in rhythmic patterns or cycles.

What type of reasoning did  
Pythagoras probably use?





# HOMEWORK



CP: pg 7 #29 - 31

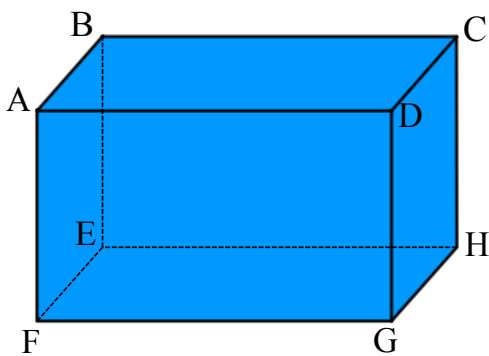
#34 - 37

pg 538 #7 - 15 (odd)

#19 - 24

D) Parallel lines  
coplanar lines that never intersect

E) Skew Lines  
non-coplanar lines that never intersect



Attachments

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UNIT 1 (PP).ppt